

REMARKS**Status of the claims:**

With the above amendments, claim 2 has been cancelled and claims 1 and 12 have been amended. Claims 1 and 3-17 are pending with claims 15-17 having been withdrawn from a restriction requirement. Accordingly, claims 1 and 3-14 are pending and ready for further action on the merits. No new matter has been added by way of the above amendments. The amendment to claim 1 has support from original claim 2. The amendment to claim 12 has support at page 6, line 3. Entry of the amendments and reconsideration is respectfully requested in light of the following remarks.

Advisory Action

The Examiner, in the Advisory Action of October 28, 2002, asserts that the amendment filed October 3, 2002 introduces both a narrow range and a broad range within the same claim and thus introduces a new issue for consideration. Applicants disagree.

The Examiner's attention is drawn to page 25, line 22 to page 26, line 3 of the specification, wherein it is described that pore volume by the nitrogen absorption method is $0.59 \text{ cm}^3/\text{g}$

or greater and median pore diameter is 8.2 nm or larger, while pore volume by the mercury intrusion porosimetry method is 0.88 cm³/g or greater and pore volume of pores with a pore diameter of 50 nm or larger determined by the mercury intrusion porosimetry method is 0.33 cm³/g or greater. From this description, it should be evident to one of skill in the art that two different porosimetry measurements are being taken. The first is a porosimetry measurement, wherein all pores are measured. The second measurement is of pores that have a diameter of 50 nm or greater. Thus, two different ranges are being claimed in claim 1. One range is claimed for all pores and the other range is for pores that have a diameter greater than 50 nm. Thus, claim 1 does not introduce both a narrow and broad range in the same claim as the Examiner asserts. Further reconsideration of the claims is respectfully requested.

Restriction

The Examiner has restricted claims 15-17 that were added in the Reply filed March 19, 2002 asserting they are not part of the same invention. Applicants traverse this restriction. Applicants submit that upon finding allowable subject matter with the product claims that the method of use claims be

rejoined. If the product is new and non-obvious then the method of using that product must also necessarily be new and non-obvious and rejoinder is proper as is consistent with the holding in *In re Ochiai*, 37 USPQ2d 1127 (Fed. Cir. 1995). Accordingly, Applicants respectfully request that the Examiner rejoin the claims upon finding allowable subject matter.

Rejections under 35 USC §112, second paragraph

Claim 9 is rejected under 35 USC §112, second paragraph as being indefinite. The Examiner asserts that "metal deposition" and "fresh catalyst" do not have sufficient antecedent basis in the claim. This rejection is traversed for the following reasons.

Applicants note the Examiner's suggestion for amendment of claim 9 proposed in the Office Action of June 3, 2002 but decline to amend the claim as the Examiner suggests. Applicants believe that the meaning of the claim would change if amended as suggested by the Examiner.

In any event, Applicants submit that claim 9, as it currently stands, is neither vague nor indefinite. One of skill in the art would recognize that the claim seeks protection for the demetallizing activity of the catalyst, that is, the

effective amount of metal, which is deposited on the catalyst during use thereof rather than the amount of the active metal supported on the carrier. See page 28, second paragraph and Table 3 of the specification. One of skill in the art would immediately recognize that the claim is of definite scope and, as such, a rejection over 35 USC §112, second paragraph is inapposite. Moreover, Applicants fail to see any problems with the alleged lack of antecedent basis as neither "metal deposition" nor "fresh catalyst" refers to anything in the antecedent (i.e., there is no "the" or "said" prior to these phrases). Withdrawal of the rejection is warranted and respectfully requested.

Rejections under 35 USC §§102/103

Claims 1, 3, 10, and 11 have been rejected under 35 USC §102(b) as being anticipated by Sherwood '994 (US Patent No. 5,094,994).

Claims 4, 5, and 8 have been rejected under 35 USC §102(b) as being anticipated by or, in the alternative, under 35 USC §103(a) as being unpatentable over Sherwood '994.

Claims 6, 7, and 9 have been rejected under 35 USC §103(a) as being unpatentable over Sherwood '994 in view of Simpson '265 (US Patent No. 4,879,265).

Claim 12 has been rejected under 35 USC §103(a) as being unpatentable over Simpson '265.

Claims 13 and 14 have been rejected under 35 USC §103(a) as being unpatentable over Simpson '265 in view of Asaoka '059 (US Patent No. 4,562,059).

These rejections are traversed for the following reasons.

Present Invention

The present invention relates to a hydrorefining catalyst comprising a hydrogenation active metal component supported on a refractory porous carrier. The hydrorefining catalyst has a median pore diameter determined by the nitrogen adsorption method of 8 to 20 nm and a pore volume determined by the nitrogen adsorption method of 0.56 - 1.0 cm³/g. The pore volume of pores having a pore diameter of 50 nm or larger determined by the mercury intrusion porosimetry method is 0.32 - 1.1 cm³/g. The pore volume determined by the mercury intrusion porosimetry method is 0.87 cm³/g or greater.

Disclosure of Sherwood '994

Sherwood '994 discloses a catalyst composition useful in the hydroprocessing of a sulfur- and metal-containing

hydrocarbon feedstock. The catalyst comprises 1.0-5.0 weight percent of an oxide of nickel or cobalt and 10.0-25.0 weight percent of an oxide of molybdenum, all supported on a porous alumina support in such a manner that the molybdenum gradient of the catalyst has a value of less than 6.0. 15-30% of the nickel or cobalt contained in the catalyst is in an acid extractable form. The catalyst is further characterized by having a total surface area of 150-210 m² /g and a total pore volume of 0.50-0.75 cc/g. The pore size distribution is as follows. Pores having diameters of less than 100A constitute less than 25.0%, pores having diameters of 100-160A constitute 70.0-85.0% and pores having diameters of greater than 250A constitute 1.0-15.0% of the total pore volume of the catalyst. A method for the hydroprocessing of a sulfur- and metal-containing hydrocarbon feedstock comprises contacting the feedstock with the above described catalyst and hydrogen is described. The catalyst is maintained at isothermal conditions and is exposed to a uniform quality of feed. The method is reputedly effective in achieving desired levels of hydrodesulfurization in vacuum residual feedstocks.

Sherwood '994 fails to disclose a pore volume as determined by the mercury intrusion porosimetry method that is 0.87 cm³/g or greater.

Disclosure of Simpson '265

Simpson '265 discloses a hydrocarbon hydroprocessing catalyst containing a Group VIB metal. In the catalyst of Simpson '265, a phosphorus component on a porous refractory oxide is prepared by impregnating support particles with a solution containing (1) phosphorus, and (2) citric acid in a mole ratio to Group VIB metal components of less than 1 to 1, followed by drying and calcining. The catalyst is reputedly useful for promoting a number of hydrocarbon hydroprocessing reactions, particularly those involving hydrogenative desulfurization, demetallization and most particularly, denitrogenation.

Simpson '265 fails to disclose γ -alumina.

Disclosure of Asaoka '059

Asaoka '059 discloses a method of preparing alumina. The method comprises a first stage in which an alumina hydrogel is formed from seed aluminum hydroxide, and a second stage in which the alumina hydrogel is processed for conversion into alumina. The first stage comprises the steps of: (a) providing an aqueous slurry containing seed aluminum hydroxide and (b) mixing a pH controlling agent with the aqueous slurry to adjust the pH of

the aqueous slurry to a value less than 5 or more than 11. Fine crystallites of aluminum hydroxide are dissolved in the aqueous slurry and the pH controlling agent is substantially free of ions, which can form a precipitate during the first step. Then, (c) an alumina compound is mixed with the aqueous slurry to adjust the pH of the aqueous slurry to a value in the range of from 6 to 11. This causes the seed aluminum hydroxide to grow. Steps (b) and (c) are repeated in sequence more than once so that the seed aluminum hydroxide grows into the alumina hydrogel.

Removal of the Rejections over Sherwood '994, Simpson '265, and Asaoka '059

The Examiner has objected to claim 2 but says it would be allowable if made independent. Accordingly, Applicants have incorporated the elements from claim 2 into claim 1. Thus, Applicants believe that claim 1 and claims 3-11, which are dependent from claim 1 are currently allowable.

Regarding the rejection of claim 12 over Simpson '265, Applicants submit that there are differences between the instant invention and Simpson '265 that render this claim and claims dependent therefrom allowable.

Simpson '265 discloses that the support particles, which are formed of alumina gel are pre-calcined to convert gamma alumina in order to prepare the support (i.e., carrier). See column 6, lines 3-11 in Simpson '265. Accordingly, the alumina gel, which is the support material in Simpson '265 is not γ -alumina.

Further, the description at column 6, lines 41-46 cited by the Examiner is directed to an "amorphous support". Simpson '265 discloses

Support particles suitable for use herein include such porous amorphous refractory oxides as silica, magnesia, silica-magnesia, zirconia, silica-zirconia, titania, silica-titania, alumina, silica-alumina, etc. with supports containing gamma, theta, delta and/or eta alumina being highly preferred Gamma alumina is the most highly preferred support. (emphasis added column 5, lines 44-51).

From this description, one of ordinary skill in the art would recognize that the amorphous refractory oxides are distinguished from the γ -alumina.

In claim 12, not only is the starting powder formed from γ -alumina, which is substantially crystalline (and not amorphous) but so is the produced carrier. Accordingly, Simpson '265 does not disclose or suggest the features of claim 12. Withdrawal of the rejection is warranted and respectfully requested.

Conclusion

With the above remarks and amendments, it is believed that the claims, as they now stand, define patentable subject matter such that a passage of the instant invention to allowance is warranted. A Notice to that effect is earnestly solicited.


If any questions remain regarding the above matters, please contact Applicant's representative, T. Benjamin Schroeder (Reg. No. 50,990), in the Washington metropolitan area at the phone number listed below.

Attached hereto is a marked-up version to show changes made.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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Attachment: Version with markings to show changes made

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

The claims have been amended as follows.

Claim 1. (Amended) A hydrorefining catalyst comprising a hydrogenation active metal component supported on a refractory porous carrier, wherein a median pore diameter determined by the nitrogen adsorption method is 8 to 20 nm, a pore volume determined by the nitrogen adsorption method is 0.56 - 1.0 cm³/g, and a pore volume of pores having a pore diameter of 50 nm or larger determined by the mercury intrusion porosimetry method is 0.32 - 1.1 cm³/g, wherein the pore volume determined by the mercury intrusion porosimetry method is 0.87 cm³/g or greater.

Claim 12. (Amended) A method of producing a hydrorefining catalyst comprising a hydrogenation active metal, comprising the steps of:

kneading a porous starting powder whose main component is γ -alumina wherein the γ -alumina in the porous starting powder is present at 90 weight % or more and [which] wherein the γ -alumina has a pore volume of 0.75 cm³/g or greater and a mean particle diameter of 10 to 200 μ m to prepare a kneaded product;

molding and calcining said kneaded product; and
supporting the active metal component on the kneaded
product or on the kneaded product after calcining.